

remainder of East Texas, and northern and western Louisiana. The warning was only partially verified. Frosts occurred on a few dates for which warnings were issued.

Northwest storm warnings were issued for the eastern portion of the Texas coast, and small-craft warnings for the western part on the morning of the 14th, and verifying velocities occurred within the period of the display. No general storm occurred without warnings.—*I. M. Cline.*

#### DENVER FORECAST DISTRICT

Disturbances that had developed on the Plateau, or had advanced from that portion of the Pacific coast immediately to the northwest, were present in the southern portion of the Rocky Mountain region during most of the time from the 5th to the 13th and from the 26th to the end of the month. These lows were attended, at some time during their passage eastward, by snow or rain in nearly all parts of the district except southeastern New Mexico, although the precipitation east of the Continental Divide was everywhere extremely light. On the 16th–17th a disturbance advanced southward along the eastern Rocky Mountain slope to northern Texas, where it recurved to the northeastward. It was attended by light snow in Colorado on the 17th and by violent and highly destructive local storms in southern Illinois when it crossed that region on the following day.

Warnings of moderate cold waves in eastern Colorado were issued on the mornings of the 10th, 13th, and 17th. The first of these was partially, and the last two were fully verified.

Warnings of freezing temperatures and frosts which were generally verified were issued as follows: Freezing temperature in southern New Mexico and southeastern Arizona on the 11th and 13th, and in extreme southeastern New Mexico on the 14th, 15th, 18th, and 19th. Warnings of frosts in southwestern Arizona on the 11th and 13th; in south-central New Mexico on the 14th, 15th, 18th, and 19th; in southern New Mexico on the 16th, and in the western valleys of Colorado on the 31st.

Owing to the extreme dryness on the eastern slope of the Rockies in Colorado, where some fires had already started, a fire-weather warning of strong shifting winds during the following day was issued for this portion of the State on the evening of the 31st, when a disturbance was advancing northeastward from Utah. The warning was fully justified.—*J. M. Sherier.*

#### SAN FRANCISCO FORECAST DISTRICT

As a rule the month of March was a relatively quiet one in the Pacific States Forecast District. Storm warnings were ordered on but two days, the 14th and 30th, for the north coast; on one day, the 29th, for the coast south of San Francisco; and on one day, the 30th for the San Francisco Bay region. Frost warnings were ordered for parts of California daily from the 6th to 13th and for Washington and Oregon for the 6th, 7th, and 8th, and the 23d, 25th, 28th, and 29th. These forecasts were verified in practically all instances, but the extent of damage from frosts is not definitely known. The early issue of frost warnings in Washington and Oregon was necessary because the growing season was considerably ahead of normal.

Considered from the standpoint of forecasting, the month was an interesting one, especially for California,

where except for two periods, namely the 7th to the 10th and the 26th to the 31st, inclusive, when rain fell in nearly all parts of the State, fair weather was general. The rainfall was heavy and general during the period beginning the 26th and continuing into the month of April. The occurrence of these rains was more than likely due to the abnormal developments and displacements of the area of high barometric pressure that normally is found off the California coast. In the former instance of rains in California, i. e., the 7th to 10th, this area of high barometric pressure was far north of its normal position, and its major axis paralleled the meridians, whereas usually its major axis lies more or less east to west, and with its eastern periphery impinging on the coast. In this instance, an area of low barometric pressure formed over Nevada and caused light to moderate, though general, rains in California. Beginning on the 26th, however, there was a radical departure from the normal pressure situation over the ocean. The area of high barometric pressure, normally central near latitude 32° and longitude (west) 140°, retreated westward approximately 20° in longitude, and permitted lows from the north Pacific to advance southeastward and bring California under their influence. The result was that a series of lows, the like of which had not occurred previously for a long time, crossed the coast line south of the Oregon border, and caused general and heavy rains throughout California. Occurrences such as this indicate that a knowledge of the behavior of this area of high barometric pressure is essential to determining the times of those changes from the usual fair-weather types of isobaric patterns which bring on periods of unsettled weather and rains in California.—*E. H. Bowie.*

#### RIVERS AND FLOODS

By H. C. FRANKENFIELD, in Charge of Division

With but two exceptions the floods of March in the larger rivers were very moderate, and all, aside from an ice-gorge flood in the Missouri River near Niobrara, Nebr., occurred east of the Mississippi River. The usual statistical data will be found in the table at the end of this report.

The most severe flood of the month occurred in the Connecticut River and its tributaries. Moderately heavy rains fell on March 28 and 29 but the temperatures had been high for several days, and there was a snow cover over the upper drainage basin ranging in depth from 7 to more than 20 inches, probably equivalent to at least 2 inches of water, so that with the rainfall there must have been approximately 3 inches of water, a sufficient quantity to have caused a severe flood at this time of the year regardless of other conditions. Reports, official and otherwise, indicate that disastrous floods occurred throughout New Hampshire and Vermont and in the smaller streams of the Adirondack region of New York. In the lower Connecticut River Valley the flood crest was not an unusual one for the time of the year and virtually no damage resulted. In the upper valley the damage was quite severe but it was impossible to obtain any estimates as to the amount thereof. The town of Randolph, Vt., suffered severely, two dams and 6 houses having been swept away, with resulting damage amounting to about \$50,000.